Technical note

Prenatal development of ovine fetus

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Abstract

From 39 gravid ovine genitalia in various stages of gestation, collected from a local slaughter house in Srinagar city, 37 and 4 fetuses were obtained from single and twin pregnancies, respectively. The genitalia collected were divided into four stages of gestation as: Stage- I (30–60 days); Stage-II (61–90 days); Stage-III (91–120 days); and Stage-IV (120 days to term).

Various measurements of gravid genitalia, like diameter of pregnant horn, size of ovaries, consistency of corpus luteum, volume of fetal fluids, diameter of largest cotyledon, crown anus length and length of long bones were recorded. The largest diameter of pregnant horn averaged 8.1±1.2, 13.9±0.09, 17.8±0.04 and 23.2±0.06 cm at stages-I, II, III and IV, respectively.

The length of ovaries recorded was 1.4±0.03, 1.7±0.06, 1.6±0.06 and 2.0±0.2 cm at the four stages of gestation, respectively.

The breadth of ovaries varied from 1.0±0.03, 1.2±0.03, 1.2±0.05 and 1.5±0.02 cm at the four stages of gestation, respectively.

The thickness of ovaries at the four stages of gestation were 0.7±0.02, 0.8±0.03, 0.8±0.03 and 0.9±0.06 cm, respectively. The volume of fetal fluids at the four stages of gestation recorded was 64±15, 256±34, 287±25 and 502±29 ml in allantoic fluid and 22±6, 128±50, 304±22 and 353±51 ml in amniotic fluid, respectively. The mean crown anus length observed with advancing stages of gestation was 6.7±0.9, 10.1±1.3, 31.5±0.09 and 46±1.2 cm, respectively. The mean observed length of Radium from Stage-I to Stage-IV were 1.6±0.6, 2.6±0.03, 5.5±0.2 and 8.9±0.03 cm, respectively, while that of Tibia was 2.1±0.1, 3.4±0.4, 7.3±0.3 and 12±0.3 cm, respectively. © 2000 Published by Elsevier Science B.V.

Keywords: Ovine fetus; Stages of gestation; Measurements

1. Introduction

For an accurate diagnosis of fetal age, some morphological measurements are needed which show consistently a rapid rate of growth and are least variable at a given stage. Body length and skeleton development have been successfully used for many years to estimate the fetal age (Gjesdal, 1969). Biometric studies of ovaries and corpus luteum have been employed for many years in ovinos (Podzo and Filippovi, 1989) and caprines ( Chungath and Sharma, 1991) for a prediction of the stages of gestation. However, there is a dearth of information on the development of ovine fetus at various stages of gestation. As such an attempt was made to investigate various morphological measurements in ovine fetus at different stages of gestation.

2. Materials and methods

The study was conducted on 39 pregnant ewes of nondescript breed, randomly selected from among the animals brought for slaughter at a local slaughterhouse in Srinagar city. The animals were slaughtered and
genitalia removed and collected. The fetus was removed from the genitalia and the fetal age was determined by applying the Richardson formula, $X=2.1(Y+17)$, where $X$ denotes the developmental age in days and $Y$ the crown anus length in cm. The pregnancies were divided into four stages as: Stage I (30–60 days); Stage II (61–90 days); Stage III (91–120 days); and Stage IV (121 days to term). Various measurements of gravid genitalia and fetus were recorded as follows:

**Diameter of gravid horn:** The largest diameter of pregnant horn was recorded at the point of head of fetus using nylon thread and flexible steel measuring tape.

**Size of ovaries:** The length, breadth and thickness of the ovaries were recorded by using a Vernier callipers.

**Consistency of Corpus luteum:** Consistency of corpus luteum was recorded by feeling the C L manually as flabby or firm.

**Volume of fetal fluids:** The allantoic and amniotic fluids were collected in a measuring cylinder and their volumes recorded.

**Diameter of largest cotyledon:** The diameter of the largest cotyledon was recorded by using a Vernier callipers.

**Crown anus length:** The crown anus length of fetus from the vertex of skull to the anus was measured by using a nylon thread and a measuring tape and recorded.

**Length of long bones:** The lengths of Radius and Tibia were recorded by using a Vernier callipers, nylon thread and flexible steel measuring tape to the nearest mm.

The data was analyzed using standard statistical procedures laid out by Snedecor and Cochran (1967).

### Table 1

<table>
<thead>
<tr>
<th>Stage of gestation</th>
<th>Diameter of gravid horn (cm)</th>
<th>Measurement of ovaries (cm)</th>
<th>Volume of fetal fluids (ml)</th>
<th>Diameter of largest cotyledon (cm)</th>
<th>Crown--anus length</th>
<th>Length of long bones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I (30–60 days)</td>
<td>8.15 ± 1.2</td>
<td>1.4 ± 0.03</td>
<td>22 ± 6.0</td>
<td>64 ± 14.8</td>
<td>6.7 ± 0.9</td>
<td>50 ± 4.6</td>
</tr>
<tr>
<td>Stage II (61–90 days)</td>
<td>11.3 ± 0.9</td>
<td>1.7 ± 0.1</td>
<td>128 ± 50</td>
<td>256 ± 35</td>
<td>10.1 ± 1.3</td>
<td>8.8 ± 0.2</td>
</tr>
<tr>
<td>Stage III (91–120 days)</td>
<td>17.8 ± 0.4</td>
<td>1.6 ± 0.1</td>
<td>304 ± 22</td>
<td>287 ± 25</td>
<td>31.5 ± 0.9</td>
<td>12.1 ± 0.3</td>
</tr>
<tr>
<td>Stage IV (121 days-term)</td>
<td>23.3 ± 0.6</td>
<td>2.0 ± 0.2</td>
<td>352 ± 51</td>
<td>501 ± 29</td>
<td>46.0 ± 1.2</td>
<td>12.1 ± 0.3</td>
</tr>
</tbody>
</table>

- **Mean values in the same column with different letters differ significantly at $p<0.05$.**

### 3. Results and discussion

The mean values of various parameters recorded are given in Table 1. It was seen that uterine volume and weight increases with the fetal age in ewes and was in agreement with the findings of Robinson et al. (1977). Similar observations on the growth of conceptus have been reported in goats (Kadu and Kaikini, 1984). Uterine distensions have also been registered during gestation in ewes through laparoscopy (Wani and Buchoo, 1990). Our observations in the present study are similar to those reported above. There was an increase (69.33%) in the diameter of gravid uterine horn at Stage II of gestation compared to that of Stage I ($p<0.05$). The rate of increase during the third stage of pregnancy was slower than between the 1st and 2nd stages (28.9%). However, there was a tremendous increase in the diameter of uterus horn at the fourth stage as compared to the 1st stage of pregnancy (185.89%).

The measurements of ovaries differ between different stages. The ovaries containing C L were larger in size than those not carrying the C L. The C L of early pregnancy and up to 90 days of gestation was soft and fleshy in colour while in late stages of gestation it was firm and brownish in colour.

The volume of allantoic fluid increased significantly ($p<0.05$) at all stages except between Stage II and Stage III, whereas amniotic fluid increased significantly between all stages ($p<0.05$).

The diameter of largest cotyledon varied between 2 cm at Stage I to 4.4 cm at Stage IV of gestation. The pattern of crown anus length observed in this study is similar to those reported by Kadu and Kaikini (1984) and Richardson (1980). However, the differences in values could be attributed to the breed, nutritional status, age and genetic factors, as these
factors have been reported to affect fetal growth and development.

The mean values recorded with respect to length of long bones (Radius and Tibia) showed a significant increase at all stages of gestation ($p<0.05$), except between stages I and II. The figures recorded are more or less similar to those recorded by Richardson (1980).

**References**
